

---

**KNOWLEDGE PROBE**  
**Introduction to Semiconductor Devices**

**Student Learning Outcomes:**

1. Define active and passive components.
2. Name three main categories of active semiconductor devices.
3. Name the two elements of a diode and state the primary operational characteristics of a diode.
4. Define bias and name the two types of bias and their effects on diode operation.
5. Explain the concept of a transistor.
6. Explain how a transistor can switch or amplify.
7. Define integrated circuit.

**Directions:** Circle the best answer for each question.

1. Passive electronic components like resistors, capacitors and inductors can be formed with semiconductor materials.
  - a. True
  - b. False
2. An electronic component that either amplifies or switches is called:
  - a. A passive component
  - b. An active component
3. Which of the following is NOT an active component?
  - a. Diode
  - b. Transistor
  - c. Capacitor
  - d. Integrated circuit
4. The two elements of a diode are the:
  - a. Cathode, plate
  - b. Cathode, anode
  - c. Emitter, anode
  - d. Emitter, collector
5. The main characteristic of a diode is that:
  - a. Current can flow through it in either direction
  - b. Current can only flow from anode to cathode
  - c. Current can only flow from cathode to anode
  - d. The direction of current flow depends on bias polarity

- 
6. Forward bias means that the anode is positive and the cathode is negative.
    - a. True
    - b. False
  
  7. Current flows when the diode is reverse biased.
    - a. True
    - b. False
  
  8. To forward bias a diode the end of the diode with the band around it must get what polarity?
    - a. Positive
    - b. Negative
    - c. Either
    - d. Neither
  
  9. When a diode is conducting it acts like a switch that is:
    - a. Open
    - b. Closed
  
  10. When a silicon diode is conducting it has a voltage drop across it of about:
    - a. 0.1 volt
    - b. 0.3 volt
    - c. 0.7 volt
    - d. 1.2 volt
  
  11. The basic function of a transistor is to:
    - a. Amplify
    - b. Switch
    - c. Both of the above
    - d. None of the above
  
  12. How many terminals or leads does a transistor have?
    - a. 2
    - b. 3
    - c. 4
    - d. As many as the application requires
  
  13. What controls the current through a transistor?
    - a. The amount of external voltage
    - b. The amount of external resistance
    - c. The type of transistor
    - d. The voltage or current on the control element

14. A transistor that is not conducting acts like a(n):
- Open switch
  - Closed switch
  - Resistor
  - Capacitor
15. A transistor amplifies because it can:
- Actually make a small voltage larger
  - Switch off and on at a rapid rate
  - A small input voltage produces large resistance changes in the transistor
  - A small input voltage variation causes a large current variation of the same shape in the output
16. Which of the following best describes an integrated circuit?
- A small semiconductor device that is a miniature computer
  - Multiple independent diodes and transistors on a single piece of silicon
  - Active and passive components all made on a single silicon chip that are wired together to become one or more complete functional circuits
  - A very large active circuit